A2T Q3T1 Review Key

1) $P = 25$, $R = .05$, $t = 15$

$A = 25(1+.05)^{15}$

$A = 51.97$

C

2) $2008 - 1998 = 10$ years

$P(10) = 80(.98)^{10}$

$P = 65.37$

P = 65 wolves

3) $A = 200,000$, $P = 125,000$, $r =$, $t = 10$

$\frac{200,000}{125000} = \frac{125000(1+r)^{10}}{125000}$

$1.6^{(\frac{1}{10})} = (1+r)^{10(\frac{1}{10})}$

$1.048 = 1+r$

$-1 \quad -1$

$.048 = r$

4.8% = growth rate

4) $G = 25000$, $I = 25$

$\frac{25000}{25} = \frac{25(3.1)^{.226t}}{25}$

$1000 = 3.1^{.226t}$

$\frac{\log_{3.1} 1000}{.226} = \frac{.226t}{.226}$

$27.015 = t$

27 hours

5) Triple so $100(3) = 300$

$\frac{300}{100} = \frac{100(90)^{\frac{t}{9}}}{100}$

$3 = 90^{\frac{t}{9}}$

$(\frac{9}{1})\log_{90} 3 = \frac{t}{9}(\frac{9}{1})$

$9\log_{90} 3 = t$

$t = 2.197$

6) $\log_b x = Y$

$b^Y = x$

D

7) $\log_5 x = 2$

$5^2 = x$

$25 = x$

$\sqrt{x} = \sqrt{25}$

$x = 5$

Exponential Log

8) $L^m = E$ $\quad \log_L E = m$ **A**

9) $\log_a x = b \rightarrow a^b = x$ **D**

10) Inverse is shown Exponential Log form

$y = 2^x \rightarrow$ Inverse is $x = 2^y$ $\quad \log_2 x = y$ **A**

11) $y = \log_4 x \longrightarrow$ Inverse is $x = \log_4 y$ $\quad 4^x = y$ **C**

12) $\log_3 \sqrt{9x^3} = \log_3 (9x^3)^{\frac{1}{2}} = \frac{1}{2}\log_3 9x^3 = \frac{1}{2}(\log_3 9 + \log_3 x^3)$

$= \frac{1}{2}(2 + 3\log_3 x) = 1 + \frac{3}{2}\log_3 x$ **B**

13) $P = 10000$ $\quad A = 10000(1+.08)^7$

$r = .08$ $\quad$ **A = $17138.24**

$t = 7$

14) $\frac{50000}{25000} = \frac{25000\, e^{.05t}}{25000}$

$2 = e^{.05t}$

$\frac{\ln 2}{.05} = \frac{.05t}{.05}$

$13.863 = t$

$13.9 = t$

15) $\log a + \frac{1}{2}\log b$

$\log a + \log b^{1/2}$

$\log a + \log \sqrt{b}$

$\log a\sqrt{b}$ **C**

16) $\log_4(x^2+3x) - \log_4(x+5) = 1$

$\log_4 \frac{x^2+3x}{x+5} = 1 \rightarrow 4^1 = \frac{x^2+3x}{x+5} \rightarrow 4 = \frac{x^2+3x}{x+5}$

$4(x+5) = x^2+3x \rightarrow 4x+20 = x^2+3x$

$-4x-20 \quad -4x-20$

$0 = x^2 - x - 20$

$(x-5)(x+4)$

$x=5 \checkmark \quad x=-4 \checkmark$

17) $\log_4(x-3) = 1 - \log_4 x$

$+\log_4 x \quad +\log_4 x$

$\log_4(x-3) + \log_4 x = 1$

$\log_4(x(x-3)) = 1$

$4^1 = x^2 - 3x$

$0 = x^2 - 3x - 4$

$(x-4)(x+1)$

$\boxed{x=4} \quad x=-1$ reject (doesn't check)

18) $x^2 - 2x - 15 = 0$

$(x-5)(x+3) = 0$

$\boxed{x=5} \quad \boxed{x=-3} \quad \boxed{C}$

19) $\frac{4x-5}{x^2-49}$ $\quad x^2-49 \neq 0$

$(x+7)(x-7) \neq 0$

$x \neq -7 \quad x \neq 7$

$\boxed{A}$

20) $\frac{(3x)\frac{3}{x} - \frac{x}{3}(3x)}{(3x)\frac{1}{3} + \frac{1}{x}(3x)}$

LCD $3x$

$\frac{9-x^2}{x+3} = \frac{(3-x)(3+x)}{(x+3)} = \boxed{3-x}$

21) $\frac{3}{2+3i} \cdot \frac{2-3i}{2-3i} = \frac{6-9i}{4-9i^2} = \frac{6-9i}{4+9} = \frac{6-9i}{13}$ **D**

22) $e^{3\ln 4} = x$ change to ln form

$e^{\ln 4^3} = x$ log form

$e^{\ln 64} = x \rightarrow \ln x = \ln 64$

$x = \boxed{64}$ **B**

23) $\ln(3e^{2x}) = \ln 3 + \ln e^{2x} = \ln 3 + 2x \cdot \ln e$ ✱ $\ln e = 1$

$\ln 3 + 2x$ **C**

24) $\frac{p}{9} \quad \frac{7}{9} = \frac{p}{12} \quad \frac{9p}{9} = \frac{84}{9} \quad p = \frac{84}{9} = \boxed{\frac{28}{3}}$

25) $x^2 - y = 4$ $\quad y = 3x \rightarrow x^2 - 3x = 4$

$x^2 - 3x - 4 = 0$

$(x-4)(x+1) = 0$

$x = 4 \quad x = -1$

$y = 3x \quad y = 3x$

$y = 3(4) \quad y = 3(-1)$

$y = 12 \quad y = -3$

$\boxed{(4, 12) \quad (-1, -3)}$ **B**

26) $\log(x-3) + \log(x+4) - \log x = \log 5$

$\log(x-3)(x+4) - \log x$

$\log \frac{x^2+x-12}{x} = \log 5$

$\frac{x^2+x-12}{x} = 5$

$5x = x^2+x-12$

$-5x \qquad -5x$

$0 = x^2-4x-12$

$(x-6)(x+2)$

$x=6$ $\quad x=-2$ reject

B